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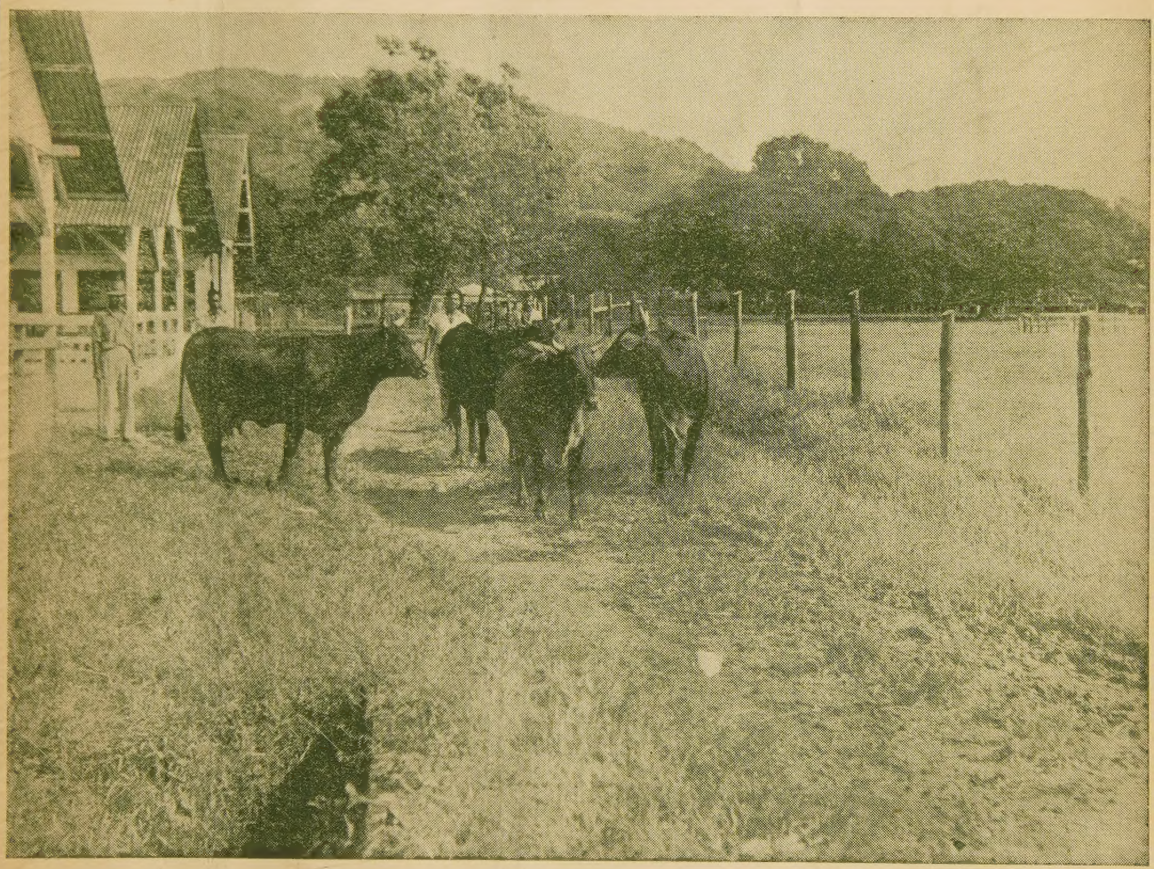
DEPARTMENT OF AGRICULTURE

ADMINISTRATION REPORT 1949



COLONY OF TRINIDAD AND TOBAGO

Trinidad—A. 11/51

[Price 48c.]

8 DEC 1951

COVER ILLUSTRATION : Half-bred Holstein × Zebus at the Trinidad Stock Farm. They average 5,000 lb. milk per lactation period of 305 days.

Photo by D. H. Constable

ADMINISTRATION REPORT

OF THE

DIRECTOR OF AGRICULTURE

TRINIDAD AND TOBAGO

FOR THE YEAR 1949

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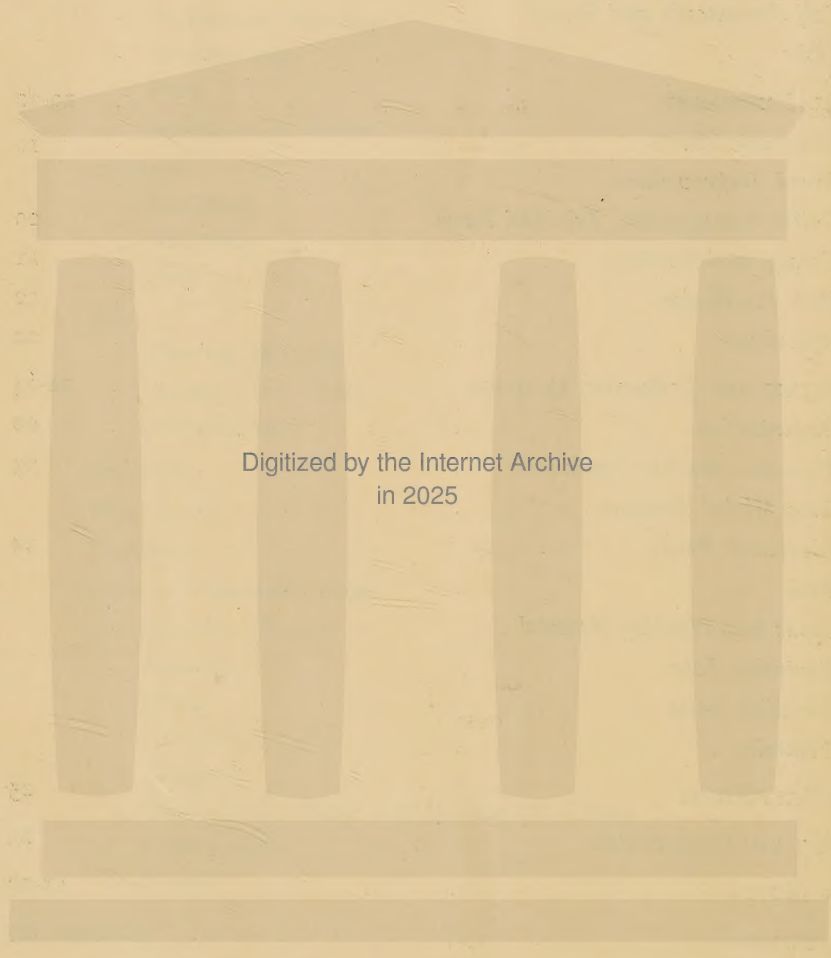

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DEPARTMENT OF AGRICULTURE, TRINIDAD AND TOBAGO
SCIENTIFIC AND TECHNICAL STAFF

(As at 30th September, 1950)

Director of Agriculture	... E. W. LEACH, B.SC., A.I.C.T.A.
Deputy Director (Crop Husbandry) ...	... C. HOLMAN B. WILLIAMS, M.A., A.I.C.T.A., D.I.C.T.A.
Deputy Director (Animal Husbandry) ...	... H. V. M. METIVIER, O.B.E., M.R.C.V.S., B.SC.
Chief Scientific Officer	... B. G. MONTSERIN, PH.D., M.SC., B.S.A.
Agronomists ...	... M. N. LUCIE-SMITH, M.A., B.SC., A.I.C.T.A., Dip. Agric. D. M. HANSCHELL, B.SC., A.I.C.T.A. VACANT
Economic Botanist ...	... L. JOHNSON, B.SC.
Entomologist ...	... R. G. FENNAH, M.A., A.I.C.T.A.
Plant Pathologist ...	... E. B. MARTYN, B.A., A.I.C.T.A.
Soil Chemist ...	... VACANT
Soil Survey Officers ...	... G. C. WITT, B.SC., A.R.C.S. D. H. CONSTABLE, M.SC., A.R.C.S., D.I.C. (Seconded as Chief Cocoa Rehabilitation Officer)
Veterinary Officers ...	... T. A. DES ILES, D.V.M., Dip. Agric. A. V. HALL, D.V.M., D.V.P.H. HOLMAN E. WILLIAMS, D.V.M., M.S. J. L. SHANNON, D.V.M. (Temporary)
Senior Agricultural Officer	... VACANT
Agricultural Officers ...	... E. G. BENSON, B.SC., A.I.C.T.A. F. D. DAVIES G. P. BLAIR, B.SC., D.I.C.T.A. J. F. BELL, B.SC. R. BARRIE-SMITH, B.SC., Dip. Agric., D.T.A. VACANT
Marketing Officer ...	... VACANT
Land Settlement Supervisor	... P. O. M. HOSTEN

Superintendent, Public Gardens, Grounds and Pastures ...	I. HOSEIN, B.SC., D.I.C.T.A.
Manager, St. Augustine Station	R. ROSS
Senior Agricultural Assistants ...	R. LEACOCK
	S. HAGLEY
	V. I. MULLOON, D.I.C.T.A.
	D. M. FARRELL
	A. E. JOSEPH
	R. MOOSAI-MAHARAJ, D.I.C.T.A.
	3 VACANT
Agricultural Assistants ...	F. O. GONZALEZ, B.SC., D.I.C.T.A. (on study leave)
	H. H. BEACH, D.I.C.T.A.
	F. A. FARRELL
	C. E. FORDE
	R. E. GREAVES
	W. O. BISHOP, D.I.C.T.A.
	I. TELFER, D.I.C.T.A.
	W. MCMILLAN
	T. O. PHILLIPS
	G. KHAN
	S. REDMAN, D.I.C.T.A.
	E. L. ITON
	S. BHARATH
Manager, Tobago Farm ...	VACANT
Supervisor, Trinidad Farm ...	P. DOMINIQUE
Stock Inspectors	D. MACFARLANE
	L. PREUDHOMME
	A. XAVIER
	H. MOHAMMED
Assistant Fishery Officer ...	CAPT. R. E. HUNTE
Inspector of Apiaries ...	E. A. EMOND
In addition there are ...	9 Field Assistants, Grade I
	63 Field Assistants, Grade II
	2 Senior Laboratory and Field Assistants
	3 Scientific Assistants
	2 Junior Scientific Assistants

INTRODUCTION

The year 1949 was, on the whole, satisfactory from an agricultural viewpoint. It is true that cacao exports were not as high as in 1948 but they were higher than in 1947 and prices were good. The sugar output was a record and coconuts recovered nicely from the 1947 drought. Citrus was disappointing but the 1950 crop started coming in before the end of the year and promises to be a record one. Rice cultivation expanded and yields were satisfactory. After a lapse of several years, banana shipments, outside the Caribbean, were resumed on a small scale. Coffee exports and prices were gratifying.

AGRICULTURAL POLICY

The aims and ideals towards which agricultural efforts should be directed are given in detail in the report of the Agricultural Policy Committee which, having been accepted by Government, is being implemented as circumstances permit. The shortage of trained staff and of funds continue to be the chief obstacles. However, preliminary work continues on the establishment of the Central Experiment Station and it is hoped that funds will be available at an early date for implementation of the composite scheme.

2. Progress has been made in the establishment of Demonstration Stations in outlying districts such as Rio Claro, Sangre Grande and Penal. These Stations, besides forming part of an educational programme, also return valuable data with respect to the behaviour of crops under conditions peculiar to the several districts. Being provided with livestock, they also illustrate the interdependence of animal and crop husbandry.

3. A summary of the main lines upon which agricultural policy continues to be directed is reproduced from previous reports and is as follows:—

(i) To prevent the exploitation of the soil and to endeavour to improve its productivity under agricultural management.

(ii) To encourage the production of local food crops bearing in mind the importance of nutritionally desirable foods both for man and livestock, to supply improved planting materials and to advise upon methods of production.

(iii) To encourage the maintenance of livestock in increased numbers and of improved productive capacity in the interests of the improved nutrition of the people and of soil fertility and to conduct investigations towards these ends.

(iv) To aid the established sugar cane, coconut, cacao and citrus industries by assistance in the supply of improved planting material and of technical advice based on the results of field experiments.

(v) To prosecute investigations designed to expand the range and improve the quality of economic crops both for export and local consumption by field trials of indigenous and imported species.

(vi) To encourage a healthy outlook on agriculture as a mode of life by the expansion of vocational education in agriculture and the creation of an informed extension service. To facilitate settlement on the land under secure tenure.

(vii) To stimulate co-operation amongst agriculturists with the object of co-operative marketing and to provide a channel for the granting of financial assistance to productive enterprises.

AGRICULTURE IN THE COLONY

General Conditions

4. January was drier and February wetter than average but March and April were again markedly dry. The rainy season set in in May and continued to the end of the year and beyond, although fair spells permitted excellent setting of both citrus and cacao fruit. Local flooding caused the loss of foodcrops, in low-lying areas, on more than one occasion and the heavy December-January (1950) rains adversely affected the cacao output, its harvest and preparation.

5. On 1st September, Tobago was struck by a cloudburst (over 20 inches in 24 hours) which appears to have been associated with a cyclonic disturbance to the north. Damage was severe in the Belle Garden, Kendal and Roxborough region, taking the form of earthslips, silting of cultivated lands and injury to and loss of crops and stock caused by the sudden swelling of streams to unprecedented proportions. A Relief Committee was appointed and the Legislature voted funds to assist the sufferers.

6. In Tables I and II which follow, the annual rainfall for a number of selected stations and the monthly means for 1949 and for a 19-year average are given. These data have been kindly supplied by the Hydrologist of the Works and Hydraulics Department.

TABLE I—ANNUAL RAINFALL, TRINIDAD AND TOBAGO

Station	Total 1949, inches	19-Year Mean, inches
North Trinidad		
River Estate, Diego Martin	75.62	74.04
St. Clair Experiment Station, Port-of-Spain	54.98	65.18
La Pastora, Santa Cruz	76.87	69.82
I.C.T.A., St. Augustine	70.52	66.85
Meteorological Station, Piarco	77.71	71.89
Frederick Estate, Caroni	85.97	79.12
Torrecilla Estate Arima	78.77	—
Works and Hydraulics, Toco	75.74	70.42
Hollis Reservoir, Valencia	108.18	121.15
Bowline Estate, Sangre Grande	112.21	103.95
Central Trinidad		
Waterloo Estate, Waterloo	71.05	67.73
Todds Road Estate, Todds Road	75.56	76.67
Tamana Teak Plantation	97.94	111.79
McBean Estate, Couva	60.96	66.29
New Lands Estate, Biche	88.62	101.76
Marper Farm, Manzanilla	92.02	98.74
Brasso-Tamana Road	96.83	102.48
Cocal Estate, Nariva	85.03	—
Forres Park Estate, Claxton Bay	66.03	59.71
South Trinidad		
Brothers Estate, Williamsville	92.10	80.46
Usine Ste. Madeleine, San Fernando	80.15	67.84
Perseverance Estate, Cedros	79.56	61.34
Poole Syndicate, Rio Claro	107.03	107.60
Pt. Fortin Filtration Plant, Point Fortin	67.82	80.57
Siparia Old Road, Fyzabad	71.14	62.45
T.L.L., Barrackpore, Penal	87.66	71.72
Mayaro Police Station, Mayaro	85.65	80.76
Moruga Police Station, Moruga	71.44	71.47
T.L.L., Guayaguayare	86.56	84.25
Tobago		
Botanic Gardens	67.03	80.23
Government Farm	59.25	65.63
Hermitage Estate	79.95	97.59
Friendship Estate	56.15	—
Green Hill Estate	59.94	—

TABLE II—MEAN MONTHLY RAINFALL, TRINIDAD AND TOBAGO,

Month	1949, inches	19-year mean, inches
January	1.48	4.09
February	3.88	2.13
March	1.34	2.09
April	1.38	2.98
May	4.81	6.29
June	11.46	9.34
July	7.41	9.95
August	15.02	10.06
September	6.58	7.74
October	7.00	7.40
November	7.53	8.98
December	12.81	8.73
Total	80.74	80.65

7. The labour supply was, on the whole, adequate, though there were temporary and local shortages at times. The year was free from any major labour disturbance.

AGRICULTURAL PRODUCTS FOR HOME CONSUMPTION

Crops

8. The interest in vegetables, other than the common tropical starches, has been maintained, especially in Trinidad, and crops were good. Indeed there was a glut of tomatoes at one time and there are signs that there is over-emphasis on three vegetables—cabbage, melongene and tomato— to the near-exclusion of others. Vegetable production in Tobago is still too low. In the latter half of the year, vegetable gardens were damaged on several occasions by floods.

9. Rice yields were good and there are signs that hill rice cultivation is on the increase. There is a strong demand for land suitable for swamp rice. The testing of rice varieties has now reached a stage permitting the introduction of pure line seed to the Caroni Irrigation Area in 1950.

10. The spring maize crop was disappointing but better yields were obtained in the autumn. There is room for increased acreages and improvement in yields to meet the local demand.

11. Supplies of ground provisions have been generally adequate though there were some shortages in Trinidad, between July and September, and in Tobago after the storm.

Livestock

12. *Supply of Feeding-Stuffs.*—There was a shortage of maize due to the poor crops in 1948 and in the year under review, and coconut-meal continued in short supply. Rice husks, from which rice bran and broken rice are obtained, were available, but at increased cost ; on the other hand there was an abundant supply of molasses at the reduced price of 7-8 cents per gallon.

13. *Diseases.*—There was only one outbreak of proclaimed disease—Swine Fever. This occurred towards the end of the year at Barataria, North Trinidad. Six reported outbreaks of the same disease as well as one of Anthrax and three of Paralytic Rabies were investigated with negative results.

14. The percentage of reactors to bovine tuberculin (Canadian) was 2.6 among 980 Government cattle tested and 4.8 among 1,235 private dairy cows in the rural districts around Port-of-Spain. Of 187 Government swine, 5.3 per cent. reacted, as compared with 1.7 per cent among 176 Government goats. On the other hand, 25 Government water buffaloes yielded 24 per cent reactors.

15. *Importations.*—The animal imports are listed in Table III.

TABLE III—ANIMALS IMPORTED INTO TRINIDAD, 1949

Type	Source	No.	Total
	Animals for Food		
CATTLE	British West Indies	15	
	Dominican Republic	852	
			867
GOATS	British West Indies	5,963	
	Venezuela	354	
			6,317
SHEEP	British West Indies	2,327	
			2,327
SWINE	British West Indies	4,861	
			4,861
	Animals for Breeding and Work		
CATTLE	British West Indies	2	
	India	12	
	United States of America	7	
	United Kingdom	1	
			22
MULES	British West Indies	92	
	Netherlands West Indies	25	
	United States of America	114	
	Virgin Islands	16	
			247
ASSES	British West Indies	32	
			32
HORSES	United Kingdom	14	
	Canada	18	
	British West Indies	22	
	France	1	
	Virgin Islands	6	
			61
SWINE	United Kingdom	4	
			4
SHEEP	United Kingdom	1	
			1
DOGS	United Kingdom	38	
	British Guiana	1	
	British West Indies	3	
	Brazil	1	
	United States of America	41	
	Venezuela	3	
			87

16. Frozen meat from Australia was again the chief source of the meat supply of the Colony.

Apiculture

17. The number of apiaries on the Register at the close of the year was 238, with a total of 2,863 colonies.

18. Weather conditions favoured honey production and good yields were obtained in most districts. The year's production returns showed a total of 176,383 lb. and exports amounted to 62,932 lb. Beeswax produced totalled 3,045 lb.

Agricultural Exports in 1949

19. As will be seen from the following comparative figures the total value of agricultural exports continues to rise:—

Year	*Value*
1946	$12,351,877
1947	16,872,844
1948	26,806,254
1949	28,376,869

20. While the value of exports of sugar and its by-products rose by five and a half million dollars over 1948, that of cacao fell by over $3,800,000 and that of citrus by over $860,000. Coffee, bananas and coconut products all showed a considerable rise.

21. The details of the 1949 agricultural exports are given in the following tables:—

Table IV—Agricultural Exports, Trinidad and Tobago, 1949

Item	Quantity	Value	Value
Sugar and By-Products		$	$
Sugar ... ...tons. ...	138,712	17,752,243	
Molasses ... ...cwts. ...	193,177	49,590	
Rum ... ...proof gals.	1,773,069	3,111,666	20,913,499
Cacao			
Raw Cacao ... ...lbs. ...	12,831,728	4,519,207	
Cocoa Butter ... ...lbs. ...	2,662	1,511	
Prepared Cocoa ... ...lbs. ...	271	170	4,520,888
Citrus			
Lime Oil—Distilled ... ...lbs. ...	19,233	139,179	
Raw Lime Juice ... ...gals. ...	64,880	42,649	
Limes, Fresh ... ...lbs. ...	6,205	761	
Fresh Grapefruit ... ...No. ...	7,764,138	323,181	
Fresh Oranges ... ...No. ...	4,003,365	83,767	
Canned Grapefruit Juice ...gals. ...	488,905	566,600	
Concentrated Lime Juice ...gals. ...	10,272	7,832	1,163,969
Tonca Beans ... ...lbs. ...	195,079	144,612	144,612
Rubber, Raw ... ...lbs. ...	2,458	590	590
Coffee			
Raw Coffee ... ...lbs. ...	2,344,817	516,387	
Prepared Coffee ... ...lbs. ...	52,369	21,915	538,302
Coconuts and Coconut Products			
Edible Oil ... ...gals. ...	42,337	85,571	
Coconut Oil ... ...gals. ...	129,215	210,036	
Margarine ... ...lbs. ...	76,893	26,053	
Lard Substitute ... ...lbs. ...	30,918	10,746	332,406
Soaps, Hard ... ...lbs. ...	264,433	41,744	41,744
Soap Stock ... ...lbs. ...	118,575	19,477	19,477
Fresh Vegetables ... ...lbs. ...	470,731	86,526	86,526

TABLE IV—AGRICULTURAL EXPORTS, TRINIDAD AND TOBAGO, 1949—*Continued*

Item	Quantity	Value	Value
		$	$
Fresh Fruit, Other sorts ... ...lbs. ...	168,262	17,880	17,880
Bananas ... ...stems ...	25,151	62,027	62,027
Peas and Beans ... ...lbs. ...	107,223	7,064	7,064
Livestock and Hides			
Livestock and Hides ... ... —	—	2,470	—
Hides ... ...lbs. ...	124,583	17,487	19,957
Bitters ... ...proof gals.	40,445	404,575	404,575
Honey ... ...lbs. ...	62,865	9,126	9,126
Milk—Fresh ... ...gals. ...	2,070	2,535	2,535
Wine			
In bottle ... ...liq. gals. ...	2,798	4,812	—
In wood ... ...liq. gals. ...	7,789	12,345	17,157
Jam, Marmalade and Fruit Jellies ...lbs. ...	92,650	13,449	13,449
Spices			
Nutmegs ... ...lbs. ...	9,750	2,872	—
Mace ... ...lbs. ...	3,499	1,302	—
Other sorts ... ...lbs. ...	624	156	4,330
Syrup ... ...lbs. ...	465,716	49,660	49,660
Coir Fibre ... ...lbs. ...	132,810	7,096	7,096
TOTAL VALUE OF EXPORTS ...			$28,376,869

Sugar

22. A record crop of 158,890 tons was harvested, as compared with 115,941 tons in 1948, and there was some mature cane which could not be harvested in time. The crop statistics for 1948 and 1949 are compared below:—

TABLE V—TRINIDAD SUGAR CROP STATISTICS

	1949	1948
Estates' canes ground, tons	930,136 (64.67%)	752,666 (65.09%)
Farmers' canes ground, tons	508,109 (35.33%)	403,711 (34.91%)
Total canes ground, tons	1,438,245	1,156,377
Sugar output, tons	158,890	115,941
Tons cane per ton sugar	9.05	9.97
Estates' area reaped, acres	29,874	28,690
Estates' canes reaped, tons	930,136	752,666
Average estate cane yield per acre, tons ...	31.14	26.23
Sugar allotted for local consumption, tons ...	20,500	20,000
Estimated standover canes :		
Estates, tons	35,815	11,652
Farmers, tons	—	10,515
Price of farmers' canes per ton	$7.71	$7.25

23. Cane fires, of unknown origin, caused the total loss of 349 acres of canes. Froghopper attacks were severe on some estates during the latter half of the year but a vigorous control campaign was undertaken.

24. Wage rates in the industry remained the same as in 1948.

25. The latest estimate of the 1950 crop is 146,500 tons.

26. The report of the Commission headed by Lord Soulbury, appointed to enquire into the working of the sugar industry in Trinidad, was received early in the year and has been the subject of close study by all interests concerned. Progress has been made with the implementation of many of the recommendations contained in the report.

Cacao

27. As predicted in the last report, following unfavourable weather at the fruit-setting period, exports of raw cacao were below those of 1948 but above those of 1947. As shown by the following table, however, good prices were maintained:—

TABLE VI—EXPORTS AND VALUE OF RAW CACAO, TRINIDAD AND TOBAGO

Year	Exports	Value
	lb.	$
1938	42,436,447	2,369,285
1945	7,731,824	1,080,047
1946	6,626,962	1,171,781
1947	9,009,644	3,205,049
1948	18,285,605	8,353,312
1949	12,831,728	4,519,207

28. With attractive prices, the salvaging of abandoned cacao is continuing and the demand for selected clonal material for replanting is growing rapidly.

Coconuts

29. Palms have recovered from the 1947 drought and this is reflected in the export figures shown in Table IV where the total value for edible oil, coconut oil, margarine and lard substitute is more than four and a half times as much as in 1948. No copra was exported as such either in 1948 or 1949 but its local price has been raised from 7 to 8.5 cents per lb.

Citrus

30. The poor crop, predicted in the 1948 Report, as a result of adverse weather at fruit-setting, did indeed materialise but the total value of exports during the calendar year did nevertheless surpass the figure for 1947. The 1950 crop promises to be a record one.

31. The Co-operative Citrus Growers' Association produced 119,484 cartons of juice from the 1949 crop and exported 64,716 crates of fresh fruit. Of the total exports of 117,234 cartons of juice 6,703 were from the 1948 crop and the remainder from that of 1949. Of the 15,545 cartons of juice sold locally 6,606 were from the 1948 and the remainder from the 1949 crop.

Other Crops

32. *Banana* exports outside the Caribbean were resumed, in a small way, in the latter half of the year by fortnightly shipments to the United States of America and proved a useful earner of hard currency.

33. *Rubber* tapping is unprofitable at current prices and wage rates, hence the near-disappearance of this item from Table IV.

34. *The Coffee* crop was satisfactory and exports showed a sharp rise over the negligible amount exported in 1948, the figure for 1949 being 2,344,817 lb. of raw coffee valued at $516,387.

WORK OF THE DEPARTMENT OF AGRICULTURE

35. The position, as regards the filling of senior technical staff posts, improved during the period under review but, at year-end, there were still several vacancies. A start has been made with filling the vacancies in the subordinate field staff and, by November, it was possible to start an in-training class for recruits and some of those serving who have had no previous formal training.

36. It is only possible, below, to give brief summaries of the work in hand. Enquiries seeking greater details will be welcomed.

Extension

37. The Extension Service continues to:—

(*a*) Do general advisory work in agriculture;

(*b*) Visit and inspect some 200 school gardens, giving advice and judging them for the Annual Competition;

(*c*) Supervise more than 10,000 acres of food gardens;

(*d*) Interview applicants and inspect Crown Lands for which application has been made, to the Sub-Intendant, for agricultural purposes ;

(*e*) Perform inspections on behalf of the Cocoa Rehabilitation and Replacement Schemes;

(*f*) Give its support to local bodies such as agricultural societies and clubs;

(*g*) Assist in the organisation of agricultural exhibitions and livestock shows;

(*h*) Supervise the breeding units in the districts;

(*i*) Supervise and manage the district demonstration stations;

(*j*) Destroy parasol ant nests on Crown Land;

(*k*) Operate the Plant Protection Ordinance;

(*l*) Obtain Crop Survey data;

(*m*) Perform any mission or obtain any information in the districts that may be required by the Agricultural Department.

38. Of the above multifarious duties, many are of a routine administration nature and their execution prevents sufficient emphasis being laid on the primary function of an efficient Extension Service which should be to apprise farmers of improved methods of agriculture and especially of those improvements obtained as

a result of local research work. This primary function has been further handicapped by the Department not being fully staffed and by many of its subordinate staff not having had the benefit of sound basic training. Steps are now being taken to rectify these defects as time and circumstances permit and in this connection, the Cocoa Board is appointing whole-time Inspectors for Cocoa Subsidy work in the main cooca areas—vacancies in the subordinate ranks are being rapidly filled and in-training courses of a general nature and on soil conservation have been instituted.

Crops

39. *Central Experiment Station*—Limited progress in the development of the Central Experiment Station has been made although funds for capital expenditure had not been released. Field work got under way and more than 120 acres of derelict cacao cultivation or scrub vegetation were mechanically cleared, cultivated and drained for crop trials. Of this area, approximately 30 acres were devoted to sugar cane trials as well as bulking of the newer varieties for distribution. Rotations and testing of new introductions of field and fodder crops occupied about 50 acres. In the low lying lands, about 25 acres were graded, drained and prepared for rice. Some 6 acres, planted the previous year to selected varieties of coconuts, were also maintained.

40. The existing citrus fields were maintained in good condition and improved by the provision of secondary roads to facilitate harvesting. Attention was also given to roads on the Station and several miles of new roads were laid down to serve the areas newly brought into cultivation.

41. More machinery and cultivation equipment were obtained and the field staff gained further experience of their use on the heavy soils with impeded drainage which are typical of a large proportion of the Central Experiment Station.

42. Towards the end of the year, the Training College Buildings were handed over to the Department of Agriculture. These have been maintained and an area of nearly 10 acres of secondary forest surrounding them have been cleared and graded. A storeroom and watchman's house were constructed at the El Carmen section on the Caroni South Bank, and several temporary structures for housing tractors, machinery, &c., were built with material salvaged from the group of estates forming the Station.

Cacao

43. *General*—Market prices continued to be satisfactory and this has been a great incentive in the reclamation of formerly abandoned cultivations as well as in rehabilitation under the subsidy scheme. Since the first distribution of clonal cacao plants in 1945, approximately 1,000 acres have been replanted and the current demand for plants is indeed gratifying. The performance of the heavy-bearing clonal plants on several soil types of the Colony now provides a further incentive for the rehabilitation of cacao estates. Clonal plants resistant to witches' broom disease (*Marasmius perniciosus*) are being produced in fair quantity but distributions must at first be limited until their productive capacity has been evaluated. In the meanwhile, hybridisation of heavy bearers and resistant clones proceeds.

44. *Clonal Propagation*—Increased demands for clonal planting material have necessitated additional nursery space and modified techniques in propagation. Given an adequate and inexpensive water supply, such as La Pastora Propagating Station enjoys, the "Open Bin" continuous daytime fog spray has proven both efficient and economical. Normal cuttings have yielded upwards of 80 per cent. successful rooting and exhaustive trials have been limited only by the inadequacy of nursery plants for supplying cuttings. As stated, many of the earlier plantings of clonal cacao are now producing very satisfactorily on different soil types. There are several records of fields, between four and five years of age, yielding well over a thousand pounds dried beans per acre.

45. *Diseases*—Witches' Broom disease continues to be a problem of some magnitude. Improved prices have made it possible for control measures to be undertaken on most plantations and the excision of "brooms" and other infected material from the trees has become routine practice once more. Several of the immune or highly resistant clones from South America are being propagated in large quantities and are undergoing field trials under commercial plantation condtions. Hybridisation of immune clones and heavy-bearing I.C.S. clones is being carried out and the seedling progenies are under observation.

46. Virus disease of cacao in Trinidad undoubtedly adversely affects the stature and yield of the trees. It is, however, mild in its effects when compared with the well-known "Swollen-shoot" disease of West Africa which is a very virulent strain. A survey of the incidence of this disease has been going on since 1942 and it appears to be restricted to the North-western portion of Trinidad.

47. *Pests*—The chief insect pests affecting clonal plantings were (*a*) parasol ants which caused defoliation in a few locations before control was effected; (*b*) thrips, of which there were a few outbreaks in the Central Range; and (*c*) beetles which appeared scattered throughout the island.

48. *Quality Sampling*—A satisfactory method of preparing small samples of cacao for quality testing still proves the main obstacle in assessing the value of the various clones from the manufacturers' point of view. It will be possible by next season to prepare bulk-fermented samples of some of the more popular clones; in the meanwhile techniques for handling small quantities are being investigated and the products are being compared with those of bulk fermentation. In the course of these investigations it has emerged that fermentation for periods longer than six days has resulted in a deterioration of chocolate flavour.

49. *Shade Trees*—The two immortelles (*Erythrina* spp.) which have been the principal shade trees used on Trinidad cacao plantations, are now known to be affected by disease in epidemic proportions. The "Bocare", or swamp immortelle, used mainly on low lands, has been, for several years, subject to infection by a fungus parasite (*Calostilbe* sp.) and epidemics have wiped out this shade in large areas extending from Sangre Grande to Manzanilla. During the past three or four years, another disease resulting in rapid death of the trees appeared in the Central Range on the "Anauca" or mountain immortelle. This disease, presumed to be a virus, is also known in Venezuela.

50. Since 1940, alternative shade trees for cacao have been under investigation. Several trees have shown promise of satisfactory growth and have not, so far, been affected by *Calostilbe*. Among these are *Peltophorum ferrugineum, Schizolobium excelsum, Adenanthera* sp., and *Pithecolobium saman.*

51. The "Wild Senna", *Cassia reticulata,* which is a very rapid growing tree, attaining a height of twenty-five to thirty feet, is effective for five or six years after which the branches tend to break off. This tree has proved very useful as a shade for young cacao, especially that in the nurseries at the propagating centres.

Sugar Cane

52. The British West Indies Central Sugar Cane Breeding Station continues to supply new varieties of sugar cane which are bulked and subsequently tested out on the various soil types in Trinidad. Within recent years, several varieties have come to be regarded as standard, and B. 34104, B. 37161, B. 37172 and B. 3337 predominate on most of the sugar estates.

53. *Froghopper*—Late in the year, froghopper blight developed on approximately 3,000 acres of estate cane. Only a small proportion of this, however, was heavily blighted and it showed marked recovery by the end of the year. Control measures now in general use on the larger estates are based on drift-dusting or Knapsack dusting with D.D.T. or B.H.C. The methods of application in the latter case are still in the experimental stage. Two new compounds—dinitro-ortho-cresol and chlordane, have given promising results in a recent trial.

54. *Borers*—The large moth-borer (*Castnia licus*) was generally distributed, but abundant only in very small areas. The small moth-borers (*Diatraea* spp.) were of generally light occurrence, but one species, (*D. saccharalis*) was particularly heavy in a few well-defined areas. By arrangement between the Sugar Manufacturers' Association and the Commonwealth Bureau of Biological Control, two larval parasites, *Lixophaga diatraeae* (Cuban fly) and *Metagonistylum minense* (Amazon fly) were liberated, the latter being introduced into Trinidad for the second time.

Citrus

55. *General*—The citrus industry continues to expand rapidly; in so far as grapefruit and orange are concerned. Much of this is due to the encouragement of the Cocoa Subsidy Scheme of alternative agricultural projects in areas unsuited to cacao replanting. The lime industry, however, is rapidly declining on account of the "dying-out" disease which at present inhibits the establishment of seedling limes and severely limits budded populations.

56. Orange and grapefruit cultivations remain remarkably free from serious pests and diseases. Ants have been the most troublesome post, but the prolonged wet weather at the close of the year favoured the normally weak parasites causing Phytophthora Brown Rot of oranges, Scab in grapefruit and Corticium Thread Blight. Minor-element deficiencies of zinc and magnesium are widespread but manganese deficiency is more localized. Many plantations are applying zinc sprays and magnesium fertilisers as routine operations while, on some, the application of sulphate of ammonia appears to correct these troubles. The sudden collapse of

grapefruit on sour orange stocks is in evidence and, while not sufficient to cause immediate concern, merits close observation and further investigation in view of the march of Tristeza disease in other citrus-growing countries.

57. *Rootstock Trials*—In the St. Augustine rootstock trials, the Sour Orange and its variety, the Seville Sweet (or Bittersweet) Orange, have been shown to be more suitable than the Rough Lemon or Wild Grapefruit as regards yield, resistance to gummosis, and stock-scion congeniality.

58. *Fertilisers*—The St. Augustine manurial trials with grapefruit have now been discontinued. They have confirmed the already well-known effects on yield of nitrogen and have shown that potassium was unnecessary on the soil in question. At the Central Experiment Station, fertiliser trials, involving the major elements, nitrogen and magnesium, and the minor elements, zinc and manganese, in various combinations, have been in progress on oranges and Marsh grapefruit since 1947.

59. *Cultivation Practices*—Citrus orchards are usually left under natural cover of indigenous weeds, notably coarse grasses. This possibly results in appreciable tie-up of nitrogen to the detriment of the trees. In view of this, investigations are being directed towards the establishment of leguminous cover crops and the mechanical cultivation of citrus orchards.

60. *Introductions*—Budwood of selected strains of the Dominica Wild Grapefruit has been imported for providing rootstocks for limes and other rootstock experiments.

61. *Pests*—Small outbreaks of Green Scale (*Coccus viridis*) were successfully treated with white-oil emulsion, D.D.T.-oil emulsion, chlordane and parathion; these insecticides also proved effective against aphis. At the end of the dry season and in November, a flea-beetle (*Epitrix* sp.) was found scarrifying immature foliage. At Curepe, the moth, *Athysania* sp., has been observed damaging oranges. The fruit is punctured by the moth and the injury is followed by fungus infection and consequent fruit shedding.

62. Tests were conducted on means of ridding the trunks and branches of citrus trees of black or stinging ants which often present a problem during harvesting operations. Treatments included the application around the trunk of sticky bands impregnated with various repellent substances, the spraying of nests and main branches with D.D.T.-oil emulsion, chlordane and parathion. A definite depletion of population in the nests followed the use of D.D.T.-oil emulsion, wettable B.H.C. parathion and chlordane, but results with the last were outstandingly superior.

63. *Dying-out of Limes*—This disease threatens the lime industry of the Colony and merits special consideration. Its cause has not been definitely determined although the accompanying signs strongly indicate a virus as causative. Land on which limes have "died out" cannot grow seedling limes and budded limes grow only under intensive windbreaking and horticultural treatment. A similar disease affected the lime groves of Dominica several years ago. Today only budded limes are grown in Dominica (all seedlings having been killed by epidemic "dying-out" disease) under the protection of windbreaks supplemented by intensive cover-cropping and mulching. The disease, so far, is not known to exist in Tobago.

Coconuts

64. *Selection*—Approximately ten acres of coconuts from selected high-yielding trees have been planted at the Central Experiment Station. These include selections from Ceylon as well as from local estates. Planted on soils of impeded drainage and hence not suited to coconuts, efforts have been made to provide effective drainage by grading the beds and by constantly stirring the soil. The growth, so far, has been very satisfactory.

65. *Manuring*—Fertiliser trials on commercial plantations again illustrate that poor bearers have shown significant increases in production as a result of treatment whereas no differences between the treatments are apparent on normally good bearers. Increases have been invariably due to the application of nitrogen.

66. *Pests*—Coconut scale (*Aspidiotus destructor*) was locally abundant in a restricted area on the east coast where it appeared largely in association with *Nipaecoccus nipae*. Towards the end of the year the Coconut butterfly (*Brassolis sophorae*) appeared in widespread localities but caused no damage of economic importance.

Rice

67. Experiments with swamp rice are being conducted at Freeman Road, where a 5-acre block has been prepared, and at the Central Experiment Station where approximately 8-acres have been graded, drained and otherwise prepared for investigational work.

68. *Planting Methods*—For the second year, data have been collected on the three methods of establishing the crop—*i.e.*, broadcasting seed, drilling and transplanting seedlings. The previous year's data indicated that there was no difference in the yield obtained by the three methods but that the broadcast rice 'lodged' far more than the two other methods. The 1949 season was marked by rains which were broken by a two weeks spell of dry weather during which water was lost and weed growth affected the transplanted rice seedlings. However, broadcasting and transplanting have given significantly higher yields than drilling by some 12 per cent.

69. *Second Crop Trials*—The production of a second crop of rice suggested itself where controlled irrigation was possible. An experiment designed to determine yields, seedlings per hole and spacing requirements was carried out. The yields showed little difference but were somewhat lower than rice normally planted in May-June. Yields varied between 1,600 and 2,200 lb. per acre.

70. *Introductions*—Several new varieties are under trial. These have been introduced from British Guiana (D. 52/37), Sierra Leone and Surinam. Varietal trials are being conducted with these and with well-known Trinidad varieties. The British Guiana varieties D. 52/37 and No. 79 have again outyielded the Trinidad varieties, although, unfortunately, they have lodged considerably. Two of the Sierra Leone varieties have performed well and merit further trial.

Rotations

71. Two Crop Rotations have been laid down at the Central Experiment Station. The results of the 1949 cropping have been disappointing on account of the high rainfall and poor drainage. The present condition of the land, after severe

disturbance by deep-ploughing, bulldozing, grading, &c., has indicated fertility differences which would nullify the significance of gross yields. It is hoped that a general levelling off of these differences will soon be apparent.

72. An economic cropping rotation for peasant farming appears to be dependent upon a cash crop which is easily saleable such as sugar cane, cacao, citrus, &c. The present production of annual food crops is in the hands of peasants whose gardens are entirely hand-worked and, in the absence of manures and fertilisers, the yields provide little more than bare subsistence. It would seem that larger holdings are necessary also and that mechanisation is essential in order to reduce cultivation costs.

Root Crops

73. Work is continuing at the Central Experiment Station on improved methods of growing yams and sweet potatoes. Selection of desirable types is being made, especially of those which lend themselves to reaping by the use of mechanical equipment.

Tomatoes

74. A wide range of tomato varieties was imported for trial during the past few years, and two of these—Stoners Outdoor and Louisiana Pink, have shown great promise and have outyielded Marglobe. These can now be recommended for local distribution as dry-season tomatoes.

Pests of Vegetable Crops

75. Egg plants (melongenes) were heavily attacked towards the end of the year by Lace bug (*Corythaica* sp.) and aphis (*Aphis gossypii*). Beans were heavily attacked by aphids and red spider. Eelworm (*Heterodera marioni*) has occasioned appreciable damage in vegetable gardens of low fertility.

St. Augustine Station

76. *Revenue*—The year's revenue for the Station was a record, the figures for the past six years being as follows:—

1949	$55,963.34
1948	46,830.16
1947	44,164.95
1946	45,923.00
1945	24,031.90
1944	17,330.76

77. *Citrus*—Some 87,266 citrus plants were distributed. Of this total, 255 were on 'free issue' to Government Departments, &c. Valencia oranges were in greatest demand, over 44,000 being distributed.

78. Booking of applications for the 1950 distribution closed on 30th November. Over 165,000 plants have been ordered and more than 180,000 sour orange stocks have been transplanted to take care of the bulk of these orders.

79. For 6,539 crates of Marsh, Foster and Duncan grapefruit, delivered to the Co-operative Citrus Growers' Association, revenue amounted to $8,822.70. In addition, over 35,000 fruit were sold locally.

80. For 171 crates of sweet oranges delivered, the Citrus Growers' Association paid $427.50. In addition, some 59,000 fruit were sold locally.

81. *Avocadoes*—A total of 12,140 budded avocado plants were distributed—nearly 4,000 more than in 1948. Included in this total were 78 plants for Government Institutions. Orders for 1950 delivery total 10,345.

82. *Mangoes*—Production of mango grafts is still far short of the demand. Some 2,724 were distributed, of which 77 were on free issues. Old trees, which had been heavily pruned in 1948, have put on very good new growth. More stocks have been potted and it is hoped that there will be a substantial increase in grafted plants delivered next year.

83. *Vegetable Seedlings and Ornamental Plants*—Production of vegetable seedlings was 6,571 boxes. A total of 4,600 boxes were sold, in addition to 142 distributed on free issue; the remainder were used in maintaining the vegetable garden at the Station and in experiments conducted by the Economic Botanist.

84. The demand for decorative plants in boxes was very great. Some 4,394 boxes were produced. Of these, 3,198 were sold, 280 distributed free and the rest used in maintaining the Station's stocks.

85. Sales of flowering trees, shrubs and hedge-plants in pots amounted to 38,290. Free issues totalled 3,554.

86 *Field Crops*—Some 53 tons of sugar cane, from the museum block, were harvested and sold to the Imperial College of Tropical Agriculture. Cuttings of the '45 and '46 Barbados seedling series were transferred to the Central Experiment Station for extension.

87. Some 488 lb. La Siba and 310 lb. Tobago pigeon pea seed were sold to the Marketing Division for seed purposes. In addition, some 3,000 lb. of green peas were sold locally for food purposes.

88. Small amounts of cowpea, woolly pyrol and soya beans were reaped. After retaining seed supplies, the balances were sold locally.

89. About 30,873 lb. of Lisbon yams were harvested from approximately 1½ acres. Some 18,000 lb. were sold to the Marketing Division as seed for planting. Approximately 690 lb. of Chinese yams were reaped, the greater part of this being sold locally for food.

90. Some 22,598 lb. of dry shelled maize were produced from a total of 9.1 acres, averaging 2,483 lb. per acre.

91. Nursery plots of swamp rice were established for the Economic Botanist who is conducting trials on five acres of land belonging to this Station at Freeman Road.

92. Plantings of the Marglobe and Ponderosa varieties of tomato were very successful. Yields in the neighbourhood of 10,000 lb. per acre were obtained on a large scale.

93. *General*—Increased use was being made of sunn hemp (*Crotolaria juncea*) as a cover crop. Germination and growth at this Station is good and it is hoped by this means at least to retard the degeneration of the soil, if not actually to increase the organic matter content.

94. A 'Gem' rotary hoe was purchased during the year. This machine has proved very useful on the soils of the Station and, as far as possible, all plantings are spaced with a view to using this machine for inter-row cultivation.

95. A small Rex pump was also purchased during the year. This pump was of immense value during the dry season and it is estimated that some 12,000–15,000 sour orange stocks and budded citrus plants were saved by irrigation. Further, the deep-well 'Pomona' pump which was installed around 1931 broke its shaft in September and the Rex pump has taken its place to supply water to the elevated 15,000-gallon reservoir.

Livestock

Animal Health

96. *Incidence of Disease in the Caribbean*—The Caribbean Commission issued during the year a useful monthly statement on the incidence of contagious and proclaimed diseases throughout the Caribbean area from reports submitted by Veterinary Officers in the territories within the terms of reference of the Caribbean Commission.

97. *Veterinary Diagnostic Laboratory*—During 1949 a small veterinary diagnostic laboratory was established at the Government Farm, St. Joseph, under the direction of the Veterinary Officer, Government Farm, and staffed with a trained technician. Considerable difficulty, however, was experienced in obtaining necessary equipment from the United Kingdom and hard-currency restriction has been a factor in checking importations from the United States of America and Canada. The work undertaken since its inauguration in June has fallen under three main heads—Milk-testing, Pathological Investigations and Equine Pregnancy Diagnosis.

Proclaimed Diseases

98. One reported outbreak of Anthrax, three of Paralytic Rabies and four of Swine Fever were investigated. All proved negative except an outbreak of Swine Fever at Barataria, St. George, where appropriate action was taken. Vaccination of swine for the public, with Crystal Violet Vaccine, continued at the small fee of 48 cents per head. While the reports of Paralytic Rabies were not confirmed, it was deemed advisable to inoculate animals in the areas of Cedros, Manzanilla and Mayaro where bat-biting was prevalent.

99. *Tuberculosis*—The percentage of reactors to bovine tuberculin (Canadian) was 2.6 for 980 tests on Government cattle, as against 15.3 per cent in 1948, and 4.8 among 1,235 private dairy cows in the rural districts around Port-of-Spain. Of 187 Government swine, 5.3 per cent. reacted as compared with 1.7 per cent. among 176 Government goats. On the other hand, 25 Government water buffaloes tested yielded 24 per cent. reactors.

100. The opposition encountered in the testing of peasants' dairy cattle in the rural districts around Port-of-Spain was considerably reduced this year and there was no necessity to prosecute owners. The question of future large scale tuberculosis eradication policy was discussed early in the year with the Medical Officer of Health, Port-of-Spain and Dr. E. E. Maclachlan of the Ste. Madeleine group of Sugar Estates

when the desirability for Government Veterinary Officers carrying out the tuberculin test in a campaign of eradication was stressed and the matter is to be taken up with the Health Department for the 1951 programme of work.

101. The incidence of this disease in water buffaloes on the sugar estates continues to be high and, in one group of estates, the percentage of reactors was 26.4. The sugar plantations continued to segregate infected animals and their Veterinary Staff has advised that racks and mangers should be provided in buffalo pens in order to reduce the incidence of infection due to animals feeding from the floor.

102. *Rabies*—During the year new regulations in regard to rabies were made under the quarantine laws to enable owners of canine and feline animals to feed their animals themselves, if they so desire, during their detention. In the new legislation, owners were also given the option to call in a private veterinary practitioner to treat animals at the station.

Non-proclaimed Diseases and Pests

103. *Strangles, &c.*—There were three cases of strangles, ten of equine influenza and fifteen of shipping fever (imported mules) reported during the year.

104. *Piroplasmosis*—Three cases of Piroplasmosis and one mixed infection (Piroplasmosis and Anaplasmosis) occurred with one fatality. Pirevan has given satisfactory results in treating Piroplasmosis.

105. *Mastitis*—Mastitis occurred in some of the larger dairies and preventive measures recommended were as follows: —

(i) Good management by keeping stalls in a dry condition and providing ample bedding;

(ii) Sanitation measures—washing of milkers' hands, &c.;

(iii) Milking infected cows last;

(iv) Dipping all teats in a chlorine solution when stripped dry.

106. *Swine Erysipelas*—Five cases of clinical symptoms of the articular form of Swine Erysipelas were reported during the year.

107. *Calf Pneumonia and Scours*—Due to the frequent recurrence of a pneumonic condition often preceded or followed by digestive derangement in the youngest age-group of calves, in some of the larger dairies in the Colony, a new system of calf management (described under "Cattle Management, Trinidad Farm") was initiated at the Government Farm during the year.

108. *Ticks*—At the Trinidad Farm systematic tick control by hand spraying at fortnightly intervals was carried out during the year and the opportunity was utilised to attempt an evaluation of the merits of the newer tick control preparations under local conditions. For this purpose the cattle unit was divided into two groups (i) Dairy herd and (ii) Others. In Group (i), a commercial preparation of B.H.C. at a dilution of 1 in 500 was used. In Group (ii) B.H.C., 0.25 per cent. was combined with D.D.T., 0.25 per cent. by weight. The results indicated that the commercial preparation is unsatisfactory when used alone at fortnightly intervals. As a result the entire cattle unit was ultimately treated with B.H.C. combined with D.D.T.

and this gave good results. While the newer tickicides mentioned are less toxic, their cost locally is considerably higher than that of commercial cattle dips and the results of these experiments suggest that unless prices come down there is at present no economic substitute for arsenical dips.

109. Provision has been made in the Estimates for 1951 for the construction of a dip bath at the Trinidad Farm and the machine and hand-spraying will be discontinued when the dip vat has been erected.

Animal Husbandry

110. *Livestock Shows*—The following livestock shows were held during the year:—

(*a*) The Poultry Association's Fourth Annual Show during April, Port-of-Spain (Race Stand);

(*b*) The Trinidad Goat Society's Eighth Annual Show, Port-of-Spain (Race Stand);

(*c*) Seven Cane Farmers and Peasants Shows in the Sugar Belt Areas during the months of September and October;

(*d*) Manzanilla District Agricultural Society's Show during the last quarter of the year;

(*e*) The Tobago District Agricultural Society's Agricultural and Industrial Exhibition in December.

111. Government handed over during the year, to the Tobago District Agricultural Society, King's Camp adjoining the Tobago Stock Farm as a permanent exhibition ground. King's Camp is to be under the control of a small committee made up of the Warden as Chairman, a member of the Tobago Agricultural Society and the Veterinary Officer, Tobago.

112. *Breed Improvement*—Table VII records the services by improved sires, at the Stock Farms of Trinidad and Tobago and the district breeding units, during 1949.

TABLE VII—SERVICES BY IMPROVED SIRES, 1949

Sire	Trinidad	Tobago	Total
Stallions	55	18	73
Jacks to mares	18	45	63
Jacks to jennies	78	140	218
Bulls	1,314	100	1,414
Boars	173	99	272
Rams	—	59	59
Bucks	715	183	898

113. In addition to the above, pure-bred Sahiwal bulls, whose services were not recorded, were available throughout the year, on pastures at the following points in Tobago:—Government Stock Farm, Mount St. George, Friendship, Bon Accord, Richmond, New Grange, Lowlands and Lure. This procedure is designed to accelerate the grading up of Tobago cattle so that pure or high grade Sahiwals may be available for mating with the progeny-tested bulls of this breed recently imported from India. In Trinidad, six bulls, six bucks and four boars were on loan to individual farmers during 1949. Their services are not included in Table VII.

114. An important contribution to livestock improvement was the sale of animals held at the Tobago Farm in December when the following were sold for a total of $2,525: 1 filly foal, 1 colt foal, 1 mule colt, 3 young jennies, 3 young jacks, 4 young half-bred Sahiwal bulls, 25 young pure-bred pigs, 37 young rabbits, 60 head of poultry.

115. Routine private sales of piglets during the year totalled 50 from the Trinidad and 107 from the Tobago Farm. Also sold privately by these two farms were:—4 dairy bulls, 8 goats, 95 rabbits, and appreciable numbers of poultry and eggs. The District Demonstration Stations also sold small quantities of young pigs and eggs. Some 88 pure-bred cockerels were exchanged for common roosters owned by farmers on Government Land Settlements.

116. The special importations for breeding purposes, made in 1949, are listed below:—

Class of Stock	*Country of origin*	*Importer*
3 Sahiwal bulls (progency tested) ...	...India	...Department of Agriculture
1 Sahiwal cow and bull calf	... do.	... do.
2 Sahiwal heifers in calf	... do.	...Mr. Wm. Gordon
6 Murrah Water Buffalo bulls ...	... do.	...Sugar Manufacturers Association of Trinidad
1 pair (boar and gilt) large black pigs	...United Kingdom	Department of Agriculture
1 pair (boar and gilt) Berkshire pigs ...	... do.	... do.
1 Jersey bull	... do.	...Mr. Wm. Gordon
1 Sheep	... do.	...Imperial College of Tropical Agriculture

117. *Cattle Management, Trinidad Farm*—Important changes in the management of the dairy cattle, some in the nature of investigation and experiment, were carried out during the year. They are summarised below:—

(*a*) The stabling and stall-feeding of the dairy herd throughout the entire day. This was necessitated by the low heat tolerance of this age-group which caused the animals to cease grazing and seek shade from about 10 a.m.

(*b*) The discontinuance of the breeding of heifers younger than 24 months and the allowance of freedom of movement and liberal exercise to the pregnant animal. Under this system, the incidence of dystocia which was encountered in the early part of the year almost disappeared at year's end. While no hard and fast rule can be laid down as to the correct breeding age for all young animals, it was decided to discontinue breeding

on the basis of "weight" rather than that of "age". In the interest of livestock improvement, it is safer to err on the side of older breeding than to risk immature mating.

(*c*) The turning-out to pasture of all young stock which are brought in only for concentrate feeding—some once, others twice daily.

(*d*) A radical departure in baby-calf management was initiated in August. This change was prompted by the frequent recurrence of a pneumonic condition, often preceded or followed by digestive upsets and which was thought to be due in part to faulty physiological hygiene. The procedure under this system is briefly as follows:—

(i) The new-born calf receives 2-4 pints of colostrum at birth depending upon weight at birth.

(ii) The calf is fasted during the next 24 hours when an oleaginous laxative is administered.

(iii) The calf is then removed to a partly-covered run on clean ground in the *open* where it receives, during the next seven days, about 1 per cent. of its body-weight of colostrum or milk. This amounts to about one pint of colostrum twice daily to which is added one pint of limewater. The runs are changed to clean ground daily.

(iv) After the first week, the milk consumption is increased by one-half pint daily until the calf is receiving about 10 per cent. of its body-weight.

(v) At the end of the first month of life, the feeding of concentrates is initiated—about $\frac{1}{4}$ lb. daily. At this age (1 month), the calf is removed from its individual run to a small paddock containing the one to three-month age-group with which the practice of paddock-rotation is carried out.

While it would be premature at this stage to attempt an appraisal of this system of management, the results at the year's end were encouraging, the disease-condition prompting the experiment almost completely disappearing. Moreover, although the experiment was begun primarily with a view to disease-control, developments seem to indicate that the system may be attractive from a purely animal husbandry point of view, in that important economies in milk-consumption and increases in weight-grains seem to be achieved.

(*e*) In view of the prevalence of traumatic injuries in mature animals, the dehorning of all grade Holstein calves at birth was initiated.

118. The percentage of deaths to births of calves was 26 in 1947, 21 in 1948 and 12 in 1949.

119. *Forage and Pastures*—At both the Trinidad and Tobago farms much attention has been given to the replanting and extension of the soiling areas and their fertilisation, some 86 acres being planted in Trinidad alone. Guinea corn is proving very suitable to Tobago conditions and there is a demand for seed from farmers. At the Tobago Farm some success has been obtained in spreading legumes

(*Pueraria* and *Teramnus*) and *Ipomoea* among the soiling grasses (Guatemala, Uganda and Para). At the Trinidad Farm one silo has been filled with Uba cane forage and one with Elephant grass. At the Trinidad Farm the response to the two following mineral mixtures, fed to animals at pasture, has been gratifying:—

Mixture No. 1	*lbs.*	*Mixture No. 2*
Sodium Chloride	100	Sterilized Bone
Red Oxide of Iron	25	Meal Flour
Copper Sulphate	1	
Cobalt	2 oz.	

At the Trinidad Farm, 57 acres were fenced for pasture.

120. *Milk Production*—The Trinidad Farm produced 453,236 lb. of milk from an average of 74 milkers daily, or 17 lb. per cow per day. A further 262,042 lb. of milk was purchased and processed.

121. *Apiculture*—Five demonstration apiaries have been established at the Department's Agricultural Stations in various districts. Regular instructions and demonstrations on bee-keeping are given to settlers and the general public at these points.

122. No cases of diseases were found, but during the rainy months small damage was occasioned by the Wax Moth (*Galleria mellonella*). Infested material was promptly destroyed.

Marketing and Fisheries Division

123. *Organisation*—By Proclamation dated 10th August, 1949, the Marketing Board Ordinance, No. 7 of 1948 came into force and the Board was established on 1st October, 1949, for the purpose of acquiring the assets and performing the functions of the following Government-sponsored organisations:—

The Trinidad and Tobago Ground Provisions Board,

The Trinidad and Tobago Banana Board,

The Marketing Division of the Department of Agriculture.

124. The policy of the Board continued to be the implementation of Government's guarantee to producers to purchase their surpluses of certain specified commodities and to assist farmers and fishermen. The Board endeavours to provide services where they are lacking and to encourage group action by producers' organisations in taking over these services as they fit themselves to handle them. Thus the functions of the Board may briefly be described as follows:—

To carry on and develop the trade and activities of the Ground Provisions Depot Board, the Banana Board and the Marketing Division of the Department of Agriculture;

To assist and improve the marketing and processing of agricultural and fishery produce in the interest of producers;

To assist agricultural and fishery co-operatives to dispose of their produce to best advantage.

125. The Board is a body corporate with perpetual succession and is comprised of eight members, three of whom sit by virtue of their offices, namely:—

The Director of Agriculture,

The Accountant General,

The Marketing Officer,

and the other five are appointed by His Excellency the Governor.

126. *Produce—Market Conditions*—No severe gluts in ground provisions were observed but the periodical scarcity around August and September was marked. Tomatoes and cabbages were the only green vegetables over-supplied and the surpluses found markets in Barbados and British Guiana. A fairly good supply of fruit was available throughout the year but corn and pulses were scarce.

127. As in former years, the activities of the Division were mainly confined to rendering assistance to producers in Tobago and the Counties of St. Andrew and St. David where transportation difficulties were more likely to affect them. The items handled were sweet potatoes, tannias, bananas, plantains, corn, pigeon peas and farine, and 1,927,972 lb. were purchased, as compared with 1,889,668 lb. in 1948.

128. Records kept by the Division show a decline in receipts of produce from Tobago. In 1948, approximately 1,649 tons were received while the 1949 figure dropped to 1,167 tons.

129. Vegetables from other sources, mostly sweet potatoes, plantains and yams, increased from 2,587 tons in 1948 to 3,039 tons in 1949, the chief sources being St. Vincent, British Guiana and Barbados.

130. *Gros Michel Bananas*—The export trade in bananas was revived with fortnightly shipments going to the United States of America and, during the five months August to December, 20,314 stems were purchased for $32,462.26. Purchases were made from approximately 560 persons each fortnight and each person received an average of $5.80, while the average price paid per stem was $1.60. Rejections previous to shipment amounted to 2,294 stems, or 11.29 per cent. of all purchases, and these were sold in the local market at a loss.

131. Final selection provided 18,021 stems for export which fetched B.W.I. $43,704.92. These were despatched in ten shipments, or approximately 1,802 stems per fortnight. The average selling price was $2.42 per stem.

132. Expenses incurred in the employment of extra staff, provision of transport, hire of labour and other charges amounted to $7,988.27 or 44 cents per stem. After allowing for the loss on rejected bananas, a small surplus remained which will be held to help cushion a reduction in price which is expected during the summer months.

133. The average weight of the early shipments was 49 lb. per stem, but this was reduced in later despatches to as low as 40 lb. It is unlikely that this low average will improve to any appreciable extent until new cultivations come into production.

134. *Livestock Feeds*—Preparation of animal rations continued as in former years. Most of the imported ingredients used were obtained from Canada and the United States of America, and the effects of devaluation caused prices to rise. The following feeds were prepared:—

	Tons
Dairy Feed	474
Emergency Poultry Ration ...	66
Scratch Grain	185
Total ...	725

In addition, Departmental Stations were supplied with 517 tons of feeding stuffs.

135. *Fish*—Purchases were made from five co-operative associations on the North Coast, namely, Matelot, Grande Riviere, Sans Souci, Toco and Cumana from whom 268,638 lb. of fish were obtained; of this amount Matelot supplied 189,497 lb. More than one-third of all purchases were made in the month of July and about a quarter of this was placed in cold storage for disposal at a later period.

136. *Seeds and Planting Material*—Most of the local planting material was obtained from Departmental Stations. It comprised selected corn, pigeon peas, adlay, soya bean and yam seed. Gros Michel banana and plantain stools were purchased from selected areas for sale to estate owners and peasants and a shipment of Barbados yams was purchased, from which seed was obtained for improving the local stock.

137. Imported seeds were obtained from the United States of America and India and sales to market gardeners, through the eight existing marketing depots, amounted to $15,043.62.

138. *Cartridge Sales* to agriculturists in remote districts for the destruction of vermin reached $814.54.

139. *Fertiliser Sales* to the extent of $1,082.96 were made through marketing depots.

140. Market reports of conditions were collected weekly in eight areas and were summarised into monthly reports.

141. *Fisheries*—Dr. C. F. Hickling, Adviser on Fisheries to the Secretary of State for the Colonies, visited the island in February and a programme of visits to fishing areas was arranged. The results of these visits and of discussions held with him are embodied in his Report on the Fisheries of the Colony.

142. The Assistant Fishery Officer resigned in April, and a new appointment to the post was made in September.

143. The Matelot Fishermen's Association was encouraged to continue the cess of 1 cent per lb. on members' fish and by this means they were able to raise over $1,000 during the fishing season. Part of this sum was converted into shares in their co-operatives.

144. A committee was appointed by His Excellency the Governor to investigate and report on conditions in the fisheries of Bonasse Village, Cedros and Icacos. As a result of its report recommendations made for improving conditions at these beaches were accepted and provisions made in the 1950 Estimates.

Land Settlement

145. While no new settlement was laid out during the year, roads, buildings, &c., were adequately maintained, and development work included the laying down, extension or completion of water services at La Reconnaissance, Bamboo Grove, Munroe Road and San Francisco.

146. At year-end, there were 2,944 allotments laid out with an aggregate area of some 4,000 acres. Of the 1,247 freehold allotments, 1,198 are occupied, while, of the 1,697 leasehold allotments, 1,342 are occupied. The freehold allotments are poorly maintained and there is a tendency to fragment holdings, in some instances, and to agglomerate them in others. Nor is progress on the leasehold allotments all that is desired but here, at least, it is possible to remove the incorrigible.

147. Up to the end of 1949, settlers had erected 507 houses as compared with 404 to the end of 1948. The livestock population of the settlements continues to rise and, at year-end, there were 91 horsekind, 471 cattle, 17 sheep, 437 goats, 519 pigs, 82 rabbits and 13,651 fowls.

148. At the La Pastora Settlement a milk and a consumer co-operative are both showing great promise.

Boards and Committees

149. The Director of Agriculture was appointed Chairman of the Marketing Board and of the Standing Advisory Committee on Fisheries during the year under review, thereby increasing the number of Boards and Committees on which he sits to some 25, of which he is Chairman of 10.

150. The Deputy Director of Agriculture (Crop Husbandry), the Deputy Director of Agriculture (Animal Husbandry), and other senior members of the staff also served on several other committees. In addition to earlier appointments the first-named was placed during the year on:—

(i) The committee to review the duties placed on the Police Department by miscellaneous Ordinances.

(ii) The committee to recommend additional regulations for the Caroni Irrigation Area.

(iii) The committee to advise the Director of Education on the co-ordination of work on Adult Education by different Agencies.

Staff Notes

151. Mr. E. W. Leach, Director of Agriculture, resumed duty on 7th January, 1949, after leave in the United Kingdom.

152. Mr. C. H. B. Williams, Deputy Director of Agriculture, British Guiana, assumed duty as Deputy Director (Crop Husbandry) on 1st July, *vice* the late Dr. F. J. Pound, resigned.

153. Dr. B. G. Montserin, Cacao Agronomist, was promoted Chief Scientific Officer with effect from 7th July, 1949.

154. Mr. D. H. Constable, Soil Survey Officer, was seconded as from 1st March, 1949, to be Chief Rehabilitation Officer under the Cacao Rehabilitation Scheme.

155. Mr. R. K. Malins-Smith, Field Assistant, Grade I, has been granted two years leave of absence without pay to proceed to Ecuador for the purpose of building and commencing the operation of a cacao propagating station.

156. Mr. A. P. McWilliam, Agricultural Officer, was transferred to Sierra Leone and left the Colony on 14th June, 1949.

157. Messrs. J. F. Bell and R. Barrie-Smith were appointed Agricultural Officers as from the 3rd and 12th January, respectively.

158. Mr. N. P. Bowen was appointed, in his capacity as Registrar of Co-operatives, to be Registrar of Agricultural Co-operative Societies with effect from 1st October, 1949, *vice* the Director of Agriculture.

159. Capt. R. E. Hunt was appointed Temporary Assistant Fishery Officer as from 9th September, 1949.

160. Mr. M. N. Lucie-Smith, Agronomist, returned from the United States of America on 24th June, 1949, after studying citriculture in California and earning the Masters degree at the University of Redlands. In September he visited Dominica to study its lime industry.

161. Capt. H. V. M. Metivier, Deputy Director (Animal Husbandry), resumed duty on 24th November, 1949, after leave in the United Kingdom.

162. Mr. I. Hosein returned from a course of study at Kew Gardens and assumed duty as Superintendent, Public Gardens, Grounds and Pastures, on 16th May, 1949.

163. Messrs. P. M. Hosten, Land Settlement Supervisor, and D. B. Murray, Economic Botanist, resumed duty on 20th September, 1949 and 19th October, 1949, respectively, after vacation leave spent, respectively in the United Kingdom and Barbados.

164. At year-end, selections had been made for the posts of Plant Pathologist and Sugar Agronomist but there were vacancies for two Veterinary Officers, a Senior Agricultural Officer, a Cacao Agronomist, a Marketing Officer and three Senior Agricultural Assistants.

165. Dr. A. V. Hall acted as Manager of the Trinidad Stock Farm, in addition to his duties as Veterinary Officer, Eastern Counties, from Mr. McWilliam's departure to the end of the year.

166. Dr. J. L. Shannon, re-employed, served for the entire year as Veterinary Officer, Tobago, and, in addition, managed the Tobago Stock Farm.

167. Dr. S. Bennett served as Veterinary Officer, South, throughout the year, on a part-time basis.

Rice Growing in Trinidad, by D. B. Murray, B.A.—*Proceedings of the Agricultural Society*, June 1949, pp. 101–111.

Colic in Equines, by T. A. des Iles, D.V.M., B.V.Sc.—*Proceedings of the Agricultural Society*, June 1949, pp. 113–121.

Bloating or Acute Tympanites, by T. A. des Iles, D.V.M., B.V.Sc.—*Proceedings of the Agricultural Society*, June 1949, pp. 122–123.

Soil Conservation by V. I. Mulloon, D.I.C.T.A.—*Proceedings of the Agricultural Society*, September, 1949, pp. 199–206.

A Study of Some Methods for the Determination of Traces of Molybdenum in Citrus Leaf Tissue, by M. N. Lucie-Smith, M.A., B.Sc.—Thesis for the degree of M.A. University of Redlands, California, 1949.

Report on a Visit to the Lime Cultivations of Dominica, B.W.I., by M. N. Lucie-Smith, M.A., B.Sc.—Cyclostyled for the West Indian Limes' Association (Inc.), 1949.

Modern Trends in Citrus Cultivation, by M. N. Lucie-Smith, M.A., B.Sc.—*Proceedings of the Agricultural Society*, December, 1949, pp. 295–309.

The Evolution of Modern Trends in Cocoa Cultivation by B. G. Montserin, Ph.D., M.Sc.—*Proceedings of the Agricultural Society*, December, 1949, pp. 283–291.

The Preparation of Elephant Grass Silage and Its Feeling Value for Tropical Dairy Cattle, by A. P. McWilliam, B.Sc., and J. Duckworth, D.Sc.—*Tropical Agriculture*, XXVI, January-June, 1949, pp. 16–23.

New Genera and Species of Neotropical Cercopoidea (Homoptera), by R. G. Fennah, M.A., A.I.C.T.A.—*Ann. and Mag. Nat. Hist.*, 12th January, 1948.

Autecological Notes on Three Species of Aeneolamia (Homoptera Cercopoidea), by R. G. Fennah, M.A., A.I.C.T.A.—*Ann. and Mag. Nat. Hist.*, 12th February, 1949.

Field Tests with D.D.T. against Insect Pests of Food Crops in the Lesser Antilles, by R. G. Fennah, M.A., A.I.C.T.A.—*Tropical Agriculture*, XXV, 1948, pp. 45–52.

A Note on the Effect of Continuous Light on the Flowering of Padi, by E. G. Benson, B.Sc., A.I.C.T.A., and D. B. Murray, B.A., A.I.C.T.A.—*Tropical Agriculture*, XXV, 1948, p. 3.

	Date	References	Remarks
		AGRICULTURAL	
Gazette Notice No. 22 of 1949 ...	4th January, 1949	... Cess on Cocoa, Cocoa Industry Ordinance Ch. 23. No. 22 as amended by Cocoa Industry (Amendment) Ordinance No. 5 of 1941	Cess on cocoa, to be $2.00 per 100 lbs. from 7th January (same throughout the year)
Gazette Notice No. 91 of 1949. Production of Cane Ordinance, 1946, Section 9 (1) (*a*)	18th January, 1949	... Interim Price of Farmers' Canes ...	Interim price of farmers' cane fixed at $6.00 per ton
Government Notice No. 17 of 1949 ...	15th January, 1949	... Food and Drugs Ordinance ...	Cancellation of Order of 3rd October, 1935 fixing standard for coffee compound
Government Notice No. 28 of 1949. Sugar Quotas Order, 1949	8th February, 1949	... Sugar Quotas Ordinance, Ch. 23, No. 13	Allocation of local quotas for 1st February, 1949, to 31st January, 1950
Government Notice No. 32 of 1949 ...	11th February, 1949	... Agricultural Credit Bank Ordinance, 1945	Amendment of paragraph (*b*) of Regulation 7
Government Notice No. 34 of 1949 ...	21st February, 1949	... Production of Cane Ordinance, 1946, Section 9 (4)	Payment of excess mileage to Craignish farmers delivering canes to Ste. Madeleine Sugar Co. Ltd.
Gazette Notice No. 389 of 1949 ...	10th March, 1949	... Rice Committee	Appointment of Committee for promoting increased production of rice
Ordinance No. 7 of 1949. Bee-keeping and Bee Products (Amendment) Ordinance, 1949	do. ...	... Bee-keeping and Bee Products Ordinance, Ch. 25, No. 3	Amendment to Sections 4 and 9 (1)
Government Notice No. 69 of 1949 ...	12th April, 1949	... Sugar Industry (Labour Welfare Committee) Regulations, 1949	Regulations made by the Governor in Council under Section 9 (2) of the Sugar Industry Special Funds Ordinance, 1948
Government Notice No. 70 of 1949 ...	do. ...	... Sugar Quotas (Amendment) Order, 1949	Increasing Ste. Madeleine Sugar Co. Ltd. quota to 7,605 tons and deleting Reform Estates (1928) Ltd. and Wm. Fogarty (Craignish) and their respective figures

	Date	References	Remarks
		AGRICULTURAL—*Continued*	
Ordinance No. 14 of 1949. Ordinance relating to the manufacture of lime oil	21st April, 1949	Lime Oil (Control of Manufacture) Ordinance, 1949	Licences for the operation of lime oil manufactories
Government Notice No. 83 of 1949. Cocoa Rehabilitation Scheme	12th April, 1949	Council Paper No. 61 of 1940	Amendment to No. 5 of the Additional variation to the Cocoa Rehabilitation Scheme
Government Notice No. 90 of 1949	13th May, 1949	Bee-keeping and Bee Products Ordinance, Ch. 25, No. 3	Amendment to Principal Regulations
Gazette Notice No. 814 of 1949	19th May, 1949	Rents of Small Agricultural Holdings Ordinance, 1943	Appointment of Mr. A. A. Dukhan as Secretary of the Tobago Agricultural Rent Board
Gazette Notice No. 872 of 1949	28th May, 1949	Agricultural Credit Societies (Amendment) Ordinance, No. 20 of 1948, Section 2	Appointment of Inspectors of Societies
Gazette Notice No. 936 of 1949	16th June, 1949	Plant Protection Ordinance, Ch. 23, No. 16, Section 3	Appointment of a Chief Plant Protection Officer and of the Field Officer, Agricultural Bank, as a Plant Protection Officer
Government Notice No. 135 of 1949. Production of Cane (Requisition of Returns) Order, 1949	11th August, 1949	Production of Cane Ordinance, 1946, No. 61 of 1946	Manufacturers to submit returns to the Director of Agriculture not later than the 31st August, 1949
Government Notice No. 141 of 1949. Plant Protection (Amendment) Regulations 1949	16th August, 1949	Plant Protection Ordinance, Ch. 23, No. 16, Section 15	Amendment to Regulations 4, 10 and 14. Revocation of Part IX of Principal Regulations. Renumbering of Regulation 34 and Part X as Regulation 33 and Part IX, respectively
Government Notice No. 143 of 1949	17th August, 1949	Copra Products Control Ordinance	Fixing of minimum price to be paid by manufacturer for copra delivered him at $8.50 per 100 lbs.

	Date	References	Remarks
		AGRICULTURAL—*Continued*	
Gazette Notice No. 1286 of 1949 ...	19th August, 1949 ...	Control of Copra Order, 1946 ...	Cancellation of permits to buy or sell copra
Government Notice No. 144 of 1949. Appointing date of coming into force of Marketing Board Ordinance, 1948	do.	Marketing Board Ordinance 1948, Section 1	Date of coming into force of Marketing Board Ordinance to be 1st October, 1949
Government Notice No. 146 of 1949. Sugar Quotas (Amendment No. 2) Order, 1949	23rd August, 1949 ...	Sugar Quotas Ordinance, Ch. 23, No. 13	Substituting figure 3036 for 2701 for Woodford Lodge Estates Ltd. and figure 229 for 564 for Hindustan Estate
Government Notice No. 157 of 1949. Sugar Industry (Rehabilitation Committee) Regulations, 1949	15th September, 1949 ...	Sugar Industry Special Funds Ordinance 1948, No. 12 of 1948	Sugar Industry (Rehabilitation Committee) Regulations 1949 under Section 9 (2)
Government Notice No. 158 of 1949. Sugar Industry	do.	do.	Sugar Industry (Rehabilitation Fund) Regulations 1948 under Section 9 (1)
Government Notice No. 165 of 1949 Recovery of monies from Tarouba (Ne Plus Ultra) Agricultural Credit Society	9th August, 1949 ...	Agricultural Credit Socities Ordinance, Ch. 23. No. 4, Section 9 (4)	Authorisation of Mr. R. C. Hobson to recover all outstanding sums from members of the Tarouba (Ne Plus Ultra) Agricultural Credit Society
Government Notice No. 167 Limes Export Levy (Fixing of Rates) (Cancellation) Order, 1949	21st September, 1949 ...	Limes Export (Fixing of Rates) Order, 1942	Cancellation of Limes Export (Fixing of Rates) Order, 1942
Distribution of Pool—Cocoa Crop 1948-1949	12th October, 1949 ...	Distribution of Pool	Cocoa producers and dealers to submit slip not later than 28th February, 1950
Gazette Notice No. 1583 of 1949 ...	20th October, 1949 ...	Agricultural Co-operative Society Ordinance, Ch. 23. No. 3	Appointment of Mr. Noel P. Bowen as Registrar, Agricultural Co-operative Societies, *vice* the Director of Agriculture
Gazette Notice No. 1644 of 1949 ...	31st October, 1949 ...	Plant Protection Ordinance, Ch. 23. No. 16, Section 3	Appointment of Plant Protection Officers

	Date	References	Remarks
		AGRICULTURAL—*Continued*	
Gazette Notice No. 1739 of 1949. Price of Farmers' Canes, 1949	15th November, 1949 ...	Production of Cane Ordinance, Section 9 (1) of the 3rd Schedule	Farmers' canes priced at $7.71 per ton
Ordinance No. 39 of 1949 ...	31st December, 1949 ...	Rents of Small Agricultural Holdings Ordinance 1943, No. 14 of 1943	Repeal and replacement of Section 6 of the Principal Regulations
		VETERINARY	
Gazette Notice No. 277 of 1949 ...	17th February, 1949 ...	Veterinary Surgeons (Registration) Ordinance Ch. 25. No. 1	Veterinary Surgeons Register, List of members
Government Notice No. 37 of 1949. Dogs (Amendment) Regulations	22nd February, 1949 ...	Dogs Ordinance, Ch. 25. No. 4 ...	Amendments to Regulations 2, 9, 14. Inclusion of Regulation 9A. Words "Government Veterinary Officers for Government Veterinary Surgeons" wherever they occur.
Government Notice No. 38 of 1949 ...	do.	Feline Animals Ordinance, Ch. 25. No. 5	Amendments to Regulations 1, 5, 6. Inclusion of Regulation 3A.
Government Notice No. 115 of 1949. Dogs (Amendment No. 2) Regulations, 1949	21st June, 1949 ...	Dogs Ordinance, Ch. 25. No. 4, Section 18	Revocation and replacement of Regulation 9
Government Notice No. 116 of 1949. Feline Animals (Amendment No. 2) Regulations, 1949	do.	Feline Animals Ordinance, Ch. 25, No. 5, Section 3	Revocation and replacement of Regulation 5
Government Notice No. 128 of 1949. Diseases of Animals (Veterinary Export Certificates) Regulations, 1949	19th July, 1949 ...	Diseases of Animals Ordinance, Ch. 23. No. 2, Section 12	Fees for Veterinary Export Certificates
Government Notice No. 207 of 1949. Prohibition of exportation of swine and swine products	21st November, 1949 ...	Customs Ordinance, Ch. 32. No. 2, Section 38	Prohibition of exportation from the Colony of swine and swine products due to an outbreak of swine fever in the Colony
Government Notice No. 208 of 1949. Declaration of Swine Fever infected area	22nd November, 1949 ...	Diseases of Animals Ordinance, Ch. 25. No. 2, Section 6	Definition of Swine Fever infected area at Barataria

15th August, 1950

E. W. LEACH
Director of Agriculture

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